

⁶³
14. (New) The composition of claim ~~54~~ or ~~55~~, wherein the nanocrystal is a Group II-VI, III-V or IV semiconductor.

⁶⁴
15. (New) The composition of claim ~~54~~ or ~~55~~, wherein the nanocrystal is a ZnS-overcoated CdSe nanocrystal.

⁶⁵
16. (New) The composition of claim ~~54~~ or ~~55~~, wherein Y is a carboxylate, a sulfonate, a phosphate, a polyethylene glycol or an ammonium salt.

⁶⁶
17. (New) The composition of claim ~~54~~ or ~~55~~, wherein Z is an alkyl group or alkenyl group, optionally including nitrogen atoms and optionally further modified to provide attractive interactions with neighboring ligands.--

REMARKS

Page 12 has been amended to correct a typographical error. The locations of the formulae have been changed on the page. No changes have been made to the disclosure. Page 13 has been amended to correct a typographical error. No new matter has been added.

Claims 27, 30 and 46-48 have been cancelled. Cancellation of these claims is without prejudice, without intent to abandon any originally claimed subject matter, and without intent to acquiesce in any rejection of record. Applicants expressly reserve the right to file one or more continuing applications hereof containing the subject matter of these cancelled claims.

Claims 1, 2, 6-8, 11, 18, 20, 21, 23, 25, 26, 29, 31-35, 37, 38, 40, 41, 43-45, 49-51 and 56-59 have been amended to more clearly describe Applicants' invention or to correct typographical errors. Support for the amendments can be found throughout the specification. New claims 62-77 have been added. No new matter has been added. Claims 1-29, 31-45 and 49-77 are pending.

Applicants thank the Examiner for indicating that claims 30, 37-38, 53 and 46-49 would be allowable if rewritten in independent form. See page 6 of the Office Action. Applicants note

57

that claims 46-48 had been withdrawn from consideration in the Office Action mailed February 3, 2000, and claims 56-59 were not rejected in the instant Office Action. Thus, Applicants submit that claims 56-59 are allowable.

Objections

Claim 7 has been amended, overcoming the objection noted at page 3 of the Office Action.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 1-45 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, the Examiner alleges that the term "associated" in claim 1 is indefinite. In the interest of advancing the prosecution of this case, Applicants have amended independent claim 1 to recite "linked to" in place of "associated with", as suggested by the Examiner at page 4 of the Office Action. Other claims (claims 7, 25, 26, 43, 44, 45, 49, 56, 57, 58 and 59) have been amended consistent with this amendment. As described in Applicants' Response mailed June 5, 2000, "the term 'associated' means a chemical interaction between the compound and the semiconductor nanocrystal." The phrase "linked to" also describes a chemical interaction between the compound and the semiconductor nanocrystal. Accordingly, claims 1-45 comply with 35 U.S.C. § 112, second paragraph and Applicants respectfully request withdrawal of this rejection.

The Invention

The invention features compositions including a compound and a semiconductor nanocrystal. The semiconductor nanocrystal can be linked to the compound by a ligand of the formula $H_zX((CH_2)_nCO_2H)_y$ and salts thereof, where X is S, N, P or O=P; $n \geq 6$; and z and y are selected to satisfy the valence requirements of X. See independent claims 1 and 59. The nanocrystal can exhibit photoluminescence having a quantum yield of greater than 10% in water. See independent claims 49 and 56. The nanocrystal can exhibit photoluminescence having a quantum yield between about 10-30% in water. See independent claim 58. The nanocrystal can include a multidentate ligand. See independent claims 60 and 61.

Rejections under 35 U.S.C. §§ 102 and 103

Claim 1-27, 29, 31, 32, 34-36, 39, 41-45, 49-52, 54-55, and 60-61 have been rejected as anticipated by U.S. Patent No. 5,990,479 to Weiss *et al.* ("Weiss"). In addition, claims 28 and 33

D

have been rejected as obvious over Weiss in view of Matsumoto *et al.* *J. Phys. Chem.* 100:13781-13785 (1996) ("Matsumoto"), and claim 40 has been rejected as obvious over Weiss in view of Dabbousi *et al.*, *J. Phys. Chem. B* 101:9463-9475 (1997) ("Dabbousi"). Claims 1, 49, 60 and 61 are independent.

Weiss does not describe the features recited in the independent claims, or claims depending therefrom. The linking agent in Weiss, described at column 7, line 6 through column 8, line 59, does not have the formula $H_zX((CH_2)_nCO_2H)_y$ and salts thereof, where X is S, N, P or O=P; $n \geq 6$; and z and y are selected to satisfy the valence requirements of X, which is recited in claim 1. Thus, independent claim 1 and claims 2-27, 29, 31, 32, 34-36, 39, and 41-45 that depend from claim 1, are not anticipated by Weiss.

Weiss also does not describe a composition that includes a nanocrystal that can exhibit photoluminescence having a quantum yield of greater than 10% in water, as recited in independent claim 49, or photoluminescence having a quantum yield between about 10-30% in water, as recited in independent claim 58. Thus, independent claim 49 and claims 50-52 and 54-55 that depend from claim 49 are not anticipated by Weiss.

Finally, Weiss does not describe a nanocrystal that can include a multidentate ligand. Specifically, Weiss does not describe a nanocrystal that includes the multidentate ligands recited in independent claims 60 and 61. Indeed, Weiss does not describe multidentate ligands at all. Thus, independent claims 60 and 61 are not anticipated by Weiss.

The obviousness rejections should also be reconsidered and withdrawn for similar reasons. Matsumoto is combined with Weiss in the rejection of claims 28 and 33, which depend from independent claim 1. Dabbousi is combined with Weiss to reject claim 40, which also depends from claim 1. However, like Weiss, neither Matsumoto nor Dabbousi does not provide any teaching or suggestion using the ligand recited in claim 1. Thus, claims 28 and 33 are nonobvious over the combination of Weiss with Matsumoto and claim 40 is nonobvious over the combination of Weiss with Dabbousi.

Accordingly, Applicants respectfully request reconsideration and withdrawal of these rejections.

D

Applicant : Mounji G. Bawendi *et al.*
Serial No. : 09/160,454
Filed : September 24, 1998
Page : 12

Attorney's Docket No.: 01997-273001 / MIT 7772

Provisional Rejection

Claims 1-45 have been provisionally rejected under the judicially-created doctrine of obviousness-type double patenting as being unpatentable over claims 1-53 and 56-57 of copending Application No. 09/397,436. Due to the provisional nature of this rejection, Applicants respectfully request addressing this issue when claims are deemed allowable.

New Claims

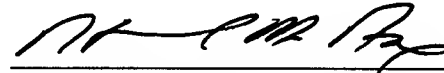
New claims 62-77 ultimately depend from independent claim 49 and are allowable over the cited references for the reasons discussed above.

CONCLUSION

Applicant submits that all of the claims are now in condition for allowance, which action is requested. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 10-31-00



Harold H. Fox
Reg. No. 41,498

Fish & Richardson P.C.
601 Thirteenth Street, NW
Washington, DC 20005
Telephone: (202) 783-5070
Facsimile: (202) 783-2331

D